

# PATENT SPECIFICATION

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## DRAWINGS ATTACHED

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## (54) IMPROVEMENTS IN AND RELATING TO TEAT-CUP LINERS

(71) We, R. J. FULLWOOD & BLAND LIMITED, a British Company, of 25/35 Beven-den Street, London, N.1, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to teat-cup liners for use in vacuum milking apparatus.

The invention provides a teat-cup liner which is of moulded integral construction and is formed at one end with a plurality of resilient flaps arranged at intervals around the mouth of the liner and extending inwardly and wherein the liner is so arranged that, when it is in position on a teat, the portion of the teat inside the liner is contacted along substantially the whole of its length by the liner, the internal diameter of the liner being such that, when the liner is in position on the teat, ballooning of the teat is prevented.

Previous liners have been held in position on teats by using the pressure difference between the inside and outside of the teat to cause the teat to expand. Liners have commonly been made with an enlarged hood portion of internal diameter considerably greater than that of the remainder of the liner and expansion of the teat into this enlarged portion holds the liner in position. This expansion or "ballooning" is, however, harmful to the teat.

The liner of the invention is secured in position by means only of the resilient flaps, which tend to grip the teat and resist movement of the liner relative to the teat. The internal diameter of the only portion of the liner that can come into contact with the teat is such that ballooning is prevented.

The flaps desirably have as large a surface area in contact with the teat as possible and this implies narrow gaps between adjacent flaps. Advantageously, however, the width of each gap between the flaps is greater towards the wall of the liner than at its other end. This allows air to leak into the liner around

the teat, which helps to reduce the pressure difference between the inside and outside of the teat, thus further reducing the tendency of the teat to expand. Also, the resulting downward flow of air over the teat tends to carry milk down to the outlet from the liner.

Preferably the flaps extend at an acute angle to the axis of the liner and towards the other end of the liner.

Advantageously, the flap surfaces that, when the teat is inserted into the liner, are in contact with the teat are provided with suckers. Preferably, substantially the whole of the contact surface of each flap is formed of a grid of suckers.

The liner, except for the end portion that is adjacent to the mouth, may be of partially flattened form so that its cross-section is oblate. This tends to prevent inward buckling of the liner which may occur when a liner of circular cross-section is collapsed.

The liner is advantageously made of synthetic rubber or other suitable flexible materials.

Two forms of teat-cup liner constructed in accordance with the invention will now be described by way of example with reference to the accompanying drawings, in which:

Figure 1 is an axial section through a teat-cup fitted with the liner;

Figure 2 is a portion of an axial section through the teat-cup of Figure 1 on a larger scale with a teat inserted into it; and

Figure 3 is a portion of an axial section through a modified form of teat-cup liner.

With reference to the accompanying drawings, Figure 1 shows a synthetic rubber teat-cup liner, generally indicated by the reference numeral 1, mounted in a rigid, tubular outer casing, generally indicated by the reference numeral 2 so that it extends inside and co-axially with the casing. The outer casing 2 has a tube 3 formed in its side for connection to a pulsator (not shown). The liner 1 is also tubular, its internal diameter decreasing slightly in a downward direction as seen in the drawings so that when a teat 14 is in-

serted into the liner 1 as shown in Figure 2, the portion of the teat inside the liner is contacted along substantially the whole of its length by the liner 1.

5 The lower end portion of the liner 1 is held in position by means of a portion 7 of the outer casing 2 which is of reduced diameter and a generally frusto-conical connecting member 8, the upper end of which is of  
10 great external diameter than the internal diameter of the lower end of the portion 7. The liner extends through the portion 7 and is stretched over the upper end of the connecting member 8, thus being held firmly in  
15 position. The lower end of the connecting member 8 can be connected to a milk outlet tube (not shown).

The upper end portion 9 of the liner 1 is of increased external diameter and, in the  
20 resulting shoulder there is formed a circular groove 10. This groove 10 houses the upper end portion of the casing 2 to form a seal so that the region bounded by the inside of the casing 2 and the outside of the liner  
25 1 is air tight.

Resilient flaps 11 are arranged at intervals around the mouth 5 of the liner 1. The flaps 11 extend inwardly and towards the other end  
30 of the liner 1, and there are narrow gaps 12 between each flap 11 and its neighbours. The lower end portion of the gap 12 that is furthest from the wall of the liner 1 is parallel-sided. The upper end portion is circular, of  
35 a larger diameter than the width of the gap 12 at its lower end. Each flap 11 is provided with a grid of suckers 13 which cover the whole of the flap surface which, in use, comes into contact with the teat.

When the teat 14 is inserted into the teat-cup liner, the flaps 11 are deflected. Figure 2  
40 shows the flaps fully deflected and extending substantially parallel to the axis of the liner 1. Because of their resilience, however, the flaps 11 are urged against the teat 14 tending to  
45 grip it and resist movement of the liner 1 relative to the teat. The suckers 13 also tend to resist this movement.

The flaps 11 are thin so that when they are fully deflected the internal diameter of  
50 the end portion of the liner 1 that is adjacent to the mouth 5 is substantially equal to the diameter of the region bounded by the flaps 11.

In a modified form of teat-cup liner, the upper end portion of the liner is tapered in  
55 an upward direction as seen in Figure 3 when unoccupied by a teat. When in position on the teat, the upper end portion is distorted by the teat and the internal diameter of this portion becomes substantially uniform. 60

#### WHAT WE CLAIM IS:—

1. A teat-cup liner which is of moulded integral construction and is formed at one end with a plurality of resilient flaps arranged  
65 at intervals around the mouth of the liner and extending inwardly and wherein the liner is so arranged that, when it is in position on a teat, the portion of the teat inside the liner is contacted along substantially the whole of  
70 its length by the liner, the internal diameter of the liner being such that, when the liner is in position on the teat, ballooning of the teat is prevented.

2. A teat-cup liner as claimed in claim 1, in which the width of each gap between the  
75 flaps is greater towards the wall of the liner than at its other end.

3. A teat-cup liner as claimed in claim 1 or claim 2, in which the flaps, when undeflected, extend at an acute angle to the axis  
80 of the liner and towards the other end of the liner.

4. A teat-cup liner as claimed in any one of claims 1 to 3, in which the flap surfaces  
85 that, when the teat is inserted into the liner, are in contact with the teat are provided with suckers.

5. A teat-cup liner as claimed in claim 4, in which substantially the whole of the contact surface of each flap is formed with a  
90 grid of suckers.

6. A teat-cup liner as claimed in any one of claims 1 to 5, which is of partially flattened form so that its cross-section is oblate.

7. A teat-cup liner as claimed in any one  
95 of claims 1 to 6, which is made of synthetic rubber.

8. A teat-cup liner substantially as hereinbefore described with reference to and as  
100 shown in Figures 1 and 2, or modified as shown in Figure 3, of the accompanying drawings.

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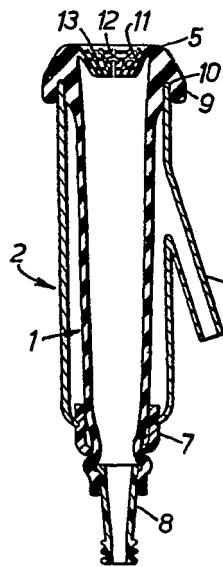


FIG. 1.

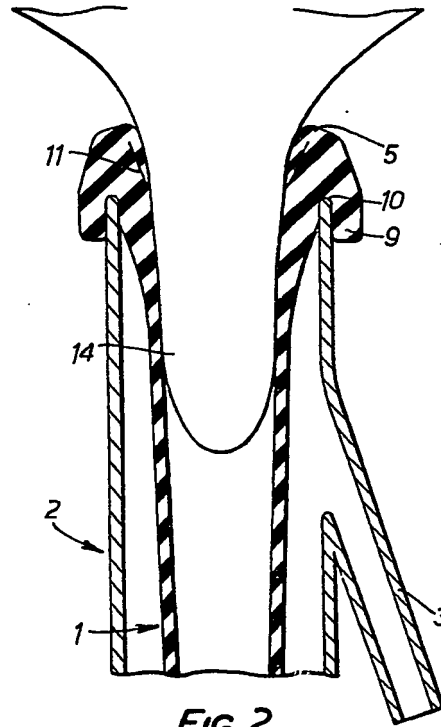


FIG. 2.

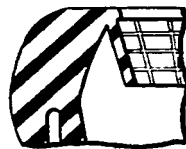


FIG. 3.